

AN INDEPENDENT EVALUATION OF
CRISKIDS™ FOR SCHOOLS

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OVERVIEW

Students who have print disabilities (are blind or unable to access printed materials) are faced with an almost insurmountable task as they encounter texts related to academic standards designed to improve higher order thinking among students. The definition of a print disability is a condition that prevents individuals from gaining information from printed materials, at anticipated levels, and requires the use of alternative access methods or specialized formats such as Braille, large print, audio, or digital text to access that information. This definition includes individuals with a visual, physical, perceptual, developmental, cognitive, or learning disability. The need addressed by the non-profit Connecticut Radio Information System (CRIS) is for students with print disabilities to be able to *read* and acquire knowledge from print and digital content that is not currently *accessible, usable, or readable*. This content may include web pages, Word documents, ePubs, RTF files, PDF documents, and text files. The positive impact that the CRISKids technology and its instructional strategy have is unique and significant because it enables students with print disabilities to independently transform, access, read, and acquire knowledge from previously inaccessible content.

Conventional methods of addressing the needs of students who have print disabilities include text-to-speech services. One major drawback of text-to-speech technologies is that computerized speech is inexpressive whereas human voice can convey emotions such as excitement, sadness, fear, or joy. Audiobooks have human narration, but they are largely designed for entertainment, and not for teaching word identification, fluency, vocabulary, and comprehension to students. All CRISKids for Schools recordings feature human narration. A preliminary study conducted by Southern Connecticut State University demonstrated students' preference for human narration.

CRISKids™ for Schools recognizes that a technology by itself is insufficient in promoting students' learning—an instructional strategy is also necessary. Thus, the project focuses on both an assistive technology and professional development activities on instructional strategies offered by Regine Randall, Graduate Reading Program Coordinator at Southern Connecticut State University.

The professional development offered to special and general education teachers participating in the CRISKids project allowed them to come together and explore supports for vocabulary, comprehension, and response. The first professional development session was scheduled before the start of the 2015-2016 school year to familiarize teachers with the services offered by CRISKids in recording diverse materials to support the curriculum as well as include the sophisticated readings required by the Common Core State Standards. In addition, teachers were provided with some independent study materials on reading and writing practices and a self-assessment for literacy instruction in their own classrooms. While not intended to be evaluative, the self-report survey allowed teachers to consider their own teaching practices in terms of what they thought was going well versus areas where students continued to struggle. The next three professional sessions were scheduled at different sites during the school year with 25-40 teachers coming to “workshop” strategy development activities. The workshops were intended to increase students' engagement with texts before, during, and after reading, introduce opportunities for

greater student collaboration, and share “low-risk writing.” These learning tasks provide the foundation for more formal or high stakes written assessment. All of these activities are associated with fostering motivation among students. Further, each professional development session was intended to increase teachers’ self-efficacy when working with students of different abilities, from different backgrounds, and with varying proficiency in English – all while using print, non-print (photographs, maps, etc.), audio, and media texts in conjunction with one another. The last professional development unit was especially unique in that Régine Randall actually had a chance to co-teach with teachers in CRISKids schools; these two sessions focused on teaching the narrative structure of fictional texts and targeting key vocabulary in the summation of nonfiction (e.g. science texts on habitat). Professional development “in situ” is considered the gold standard for teaching subject-area content and concepts more effectively; yet, trust among teachers and professional development staff needs time to develop for this approach to be effective. For this reason, professional development in the actual classroom was scheduled for the last quarter of this collaboration after teachers had multiple opportunities to participate in more traditional PD.

Lexile reading scores and related classroom behaviors

All the students in the study were in middle school (grades 6-8). The participating teachers were asked to indicate how many of the students with whom they worked improved their Lexile reading test scores, academic achievement, and related classroom behaviors. Of the students, 73% showed improvement in their reading test scores.

An additional analysis was conducted on the results of 17 students for whom other data points were collected, including such related classroom behaviors as time on task, interest in reading materials, engagement/participation in class, and class grades. Of these students, 82% showed growth during the academic year.

Students’ improvement depended on the extent to which they used CRISKids’ assistive technology. Teachers reported how often students used CRISKids by indicating one of four options: infrequently, some of the time, most of the time, or always. Consider, for example, a school in which 13 students used CRISKids. Of 13 students, 9 improved their reading skills and academic achievement. These tended to use CRISKids at least some of the time. The students who tended not to demonstrate gains used CRISKids infrequently. In another school in which 7 students used CRISKids as least some of the time, all improved in terms of their reading skills and academic achievement.

Theory of Change

To improve educational outcomes among students who have a print disability due to physical/mobility impairments, sensory/perceptual limitations, or mental/psychological limitations (The Advisory Commission on Accessible Instructional Materials in Postsecondary Education for Students with Disabilities, 2011), an intervention is needed that promotes students’ academic achievement as well as their cognitive, communicative, behavioral, and social development. An intervention of this nature is of particular relevance to students who are unable to decode texts without audio intervention; students who find reading too daunting because they cannot connect words they know only in speech to written texts; and students who experience reading as hard work and, therefore, are less motivated to read.

Offering multiple technology options to access text removes one more obstacle for students with print disabilities. When this use of technology is paired with such best practices as differentiation in materials and explicit reading instruction, students have a better chance to fully participate in the classroom and expand their potential. Students with stronger academic records are more likely to demonstrate the competencies outlined in the Standards for College and Career Readiness and, no small feat, are more likely to possess the requisite skills for admission to more selective colleges and universities.

The intervention developed by the Connecticut Radio Information System (CRIS) is comprised of print and audio components that are offered simultaneously. In this way, CRISKids helps students to identify difficult words that would be an impediment to their progress; enables students to associate sounds with the written word; and blocks out external sensory distractions (McKenna, 1998). The human voice is able to convey emotion, proper articulation, and the rhythm of language, which are all necessary components to engage students and promote their cognitive development.

Instead of requiring a teacher to read texts aloud to them (a common practice in schools), students will be able to access written texts in a non-stigmatizing way that promotes their autonomy. While guided reading activities and think-alouds are considered best practice, there is a distinction between teachers simply reading aloud so students get through texts and an interactive read-aloud and questioning that is part of sound instructional practice.

As a result, students' comprehension will improve as they gain competence in reading (word identification, fluency, vocabulary), increase their independence in learning, sharpen their focus on academics, catch up or stay at level with their classmates, and engage in text-dependent classroom discussions. Since students who feel competent in their reading and class work tend to be more engaged and less disruptive in class, CRISKids will impact not only the students who are unable to access written texts, but the learning environment of all the students in the classroom.

Theory Of Change:

Convergence of Strategies and Interventions to form CRISKids⁺



COMPARISON OF CRISKIDS TO OTHER PRODUCTS/SERVICES

Custom recordings shaped the development of CRISKids™ for Schools. Launched in November 2012, school-based initiative of CRIS provides custom recordings requested by classroom teachers in addition to its extensive line-up of children’s magazines and text exemplars featured in the Common Core State Standards. The custom recordings can be shared by educators from other schools and school districts. CRIS’s goal regarding the custom recordings is to create an extensive audio library of classroom materials that provides access instantly in the classroom. The CRISKids for Schools audio library is available on-demand from any Internet-accessible computer or mobile device. Teachers participating in the current CRISKids’ three-year pilot generally download the recordings from a computer onto an MP3 player (in the future, tablets, e-readers and smartphones will be used). Participating teachers now have the opportunity to receive custom recordings of academic print materials—such as curricular units—featuring human narration within 10 business days, a dramatic improvement over the lengthy delay provided by other services offering human narration. The following tables compare CRISKids to other products and services.

Table 1: Comparison of CRISKids to other products/services

Product and/or Services	Human Narration	Syncing Text with Highlighting	Custom Recordings	Books	Mind or Concept Linking	Devices	Price	Download limit
CRISKids	✓	✓	✓	texts students need	✓	any device that can play an mp3 file	500 / school	Unlimited
Kurzweil		✓	✓	if offered in digital format	✓	PCs & Macs	400-1500 /station	Unlimited (integrates with Bookshare et al.)
Bookshare				✓		Daisy players	Free for qualifying students; \$75 for others	Up to 100/month
Learning Ally	✓	✓		✓		Tablets, and PCs with free software download	79 / student	Unlimited
National Library Service for the Blind and Physically Handicapped	✓			✓		proprietary	No cost	
Audible.com	✓	when integrated with Kindle (requires separate subscription)		✓		any device that can play and mp3 file	14.95 / month/ student	1 book
Text-to-speech			✓	✓		Most electronic	zero	Unlimited

Table 2: Comparison of CRISKids to other products and services, continued

	Human narration	Up to date	Cost effective	Fiction	Textbooks	Multiple languages	Instructional strategy	Current youth magazines	Common Core texts	Ongoing coaching from an Organization	Pre-recorded library	Suitable for a wide range of print handicaps	Download available	Permanently accessible	Home-school relationship
CRISKids	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
AEM	X	X		X		X					X	X	X	X	
NIMAS/NIMAC	X	X	X	X	X	X					X	X	X	X	
Bookshare		X	X	X	X	X		X	X			X	X	X	
Individuals with Disabilities Education Act	X		X								X			X	
American Publishing House for the Blind		X	X									X		X	
NLS	X	X	X	X	X	X		X	X		X	X	X	X	
Accesstext		X	X	X	X				X		X	X	X	X	X

METHODOLOGY

The research evaluated the effectiveness of audio recordings featuring human narration of classroom print materials using assistive technology in support of children who have a print disability due to a learning, physical, intellectual, emotional, or perceptual disability as it pertains to accessing the same grade-level print materials as their classmates. The aim of the study was to discern the impact of CRISKids, if any, on students' on-task behavior in authentic educational settings and competence in reading.

Research question

Is there an advantage to CRISKid's assistive technology with human narration plus professional development in literacy in comparison with current conventional methods, as measured by improvement in student test scores and self-regulation behaviors?

Sample

The sample was comprised of teachers in Hartford Public Schools who were selected by their schools to participate in professional development workshops offered by Southern Connecticut State University and their students with print challenges

Measures

CEDAR Self-Regulation Scale

The *CEDAR Self-Regulation Scale* (Ben-Avie, 2011) was developed over a period of ten years at the Yale Child Study Center's School Development Program. CEDAR measures social cognition and the closely related self-regulation construct. To determine if CEDAR meets statisticians' criteria for a reliable instrument, an analysis was conducted. CEDAR's reliability was found to be very high [Cronbach's alpha = .947]. The first CEDAR section addresses strengths, and it is comprised of 24 items (e.g., "Expresses needs and feelings in a way that is likely to result in good outcomes") that are scored on a 9-point scale ranging from "Never" to "Often." The second section addresses areas of improvement, and it is comprised of 27 items (e.g., "When receiving feedback, tends to respond with arguments and explanations rather than acceptance"). In this section, the 9-point scale is reversed so that "Often" receives a low score (1) and "Never" receives a high score (9). CEDAR has two purposes: (1) to assess levels of social cognition and self-regulation, and (2) to raise the awareness of social cognition and self-regulation among educational professionals.

Focus group protocol

In preparation for a focus group discussion with participating teachers, a focus group protocol was developed. The teachers were asked to indicate, for example, the responses of students to the CRISKids assistive technology and the impact of the assistive technology on their work with students.

Student preference form

Students who used both CRISKids and computerized text-to-speech were asked their preference. The students were presented with a text about a page long. Students made their selection after listening to 5 minutes of a CRISKids recording (human narration) and 5 minutes of computerized text-to-speech.

Student Performance Form

In addition, teachers who used CRISKids with their students were asked to complete a form on criteria such as (see Appendix): Students time on-task, Effect on grades, and Effect on tests.

IRB approval

The research was conducted under the auspices of Southern Connecticut State University's IRB (Protocol Number: 15-176). Approval for the study was granted by the Hartford Public Schools Research Review Committee (11/11/15).

FOCUS GROUP

A focus group discussion was held on March 20, 2014 with educators and related-service providers to learn more about the benefits of using CRISKids with students. The focus group was comprised of educators and providers who are currently using CRISKids with students in their schools. A salient theme that emerged addressed the limitations of text-to-speech and the advantage of human narration. Samantha Grayeck, a speech pathologist with CT Regional School District 13 who participated in the focus group, pointed out that reading interventions teach students to pay attention to inflection and punctuation (which are not always clearly present in text-to-speech). For instance, students are instructed to read passages aloud and note that they tend to naturally pause between sentences (hence the need for periods at the end of sentences; semi-colons between independent clauses or simply commas used within a variety of sentence constructs). Students listening to texts that describe the emotions of characters are asked to indicate how they know that the characters are mad, sad, happy, surprised, etc. Students are taught to pay attention to indicators in the characters' speech that may reveal how they are feeling (e.g., if characters say something in a louder voice and pause between words, this may reveal that the characters feel very strongly about the point they are making).

An additional theme was that schools use CRISKids to increase students' motivation to read. Students who have print disabilities tend to feel a lack of connection to printed material and a fear of humiliation. When they cannot read independently while all the other students are able to do so or when the teacher singles them out by reading aloud only to them, students are placed in a stressful situation. Stress of this nature decreases their motivation to try to read. By way of contrast, there is a "cool factor" to using MP3 players in the classroom. Moreover, students are able to utilize CRISKids at their desks like the other students because they are not tethered to computers. Students are rewarded at some schools for time-on-task behavior: If they are diligent and complete their schoolwork in a timely manner, then they can listen-and-read one of the children's magazines that CRIS records.

Another focus group participant, Brooke Doyon, a special education intern who based her master's thesis on a study of students attending Kennelly School, a neighborhood school in Hartford, Connecticut, said that by grade three, her students have "no relationship with print in that they can't read it." Those students tell her, "I don't get it," and they are well aware that their classmates are moving forward. With CRISKids, accessing the audio versions on an MP3 player of the same materials as their classmates, they can keep up. Said Doyon, students who use CRISKids tell her "Now, I look cool and I'm reading."

Doyon and Greg Eckbolm, both of whom work for Vernon Public Schools, describe how CRISKids can help students with emotional disorders or Attention Deficit Hyperactivity Disorder. Doyon described how some students with ADHD or emotional disorders can't sit at their desks. But when using CRISKids, they are better able to stay on task.

Eckbolm stated that the frustration becomes a barrier to learning, noting that some of his students "shut down all the time." At the Vernon, Connecticut school where he teaches, CRISKids is used not only as a reward, but also as an alternative activity that helps students work independently at their desk. "It's better than having [a student] put his head down and refuse to participate," Eckbolm said.

Teri Faucher, a reading teacher at Clover Street School in Windsor, Connecticut, explained that CRISKids was used specifically with fifth graders identified with special needs or reluctant readers. The teachers downloaded a number of audio versions of children's magazines and some Common Core exemplars onto the MP3 players, letting students select what they want to read. "CRISKids really helps with the fluency for students who struggle to learn to read and [work] so hard to get the words." Students unanimously like the MP3 players and don't feel stigmatized, but rather "cool" with them," Teri said.

Grayeck, the Durham schools' speech pathologist, emphasized that while CRISKids is a motivator for students who have print disabilities, it is much more than that. The audio readers help students with print disabilities to contribute to class discussions, allowing them to read at their grade level and access the same materials read by their classmates. "We can ask them pointed questions," Grayeck said. "This is on your [grade] level. You can read to yourself now. They had been stuck [before CRISKids]."

Based on student-tests before and after using CRISKids, Doyon, the special education teacher working with Grade 7 students in Hartford, Connecticut, found that the audio versions improved reading comprehension. Students would not understand the main ideas of text after they read it. "I would ask if they understood it, and they would say 'yes,'" Doyon explained. Before using CRISKids, results of the student comprehension tests showed their complete lack of awareness of the main ideas in the story because they were so busy decoding. "I would ask a question, and they knew nothing," she said. When the students listened while following along in the text using CRISKids, their comprehension improved significantly, Doyon said.

John Pryor, an educator with the Wethersfield Public Schools and also a participant in the CRISKids focus group, explained how the custom audio recordings assisted a student with special needs to do well on his mid-term exams.

The focus group discussion indicated that CRISKids may be used by both educational professionals and families. Schools may provide families with access to recordings of Common Core text exemplars, which students may use at home as part of homework reinforcement. This is particularly critical in families in which English is not spoken or families in which the adults tend to be unfamiliar with words typically contained in Common Core text exemplars. Since the students are able to listen-and-read texts using CRISKids, their independence in completing their

homework increases, which provides them with a sense of competency. Another factor that increases students' motivation to read is having the choice of which texts to listen-and-read. With CRISKids, some teachers allow students to choose what they want to read during the school day and listen-and-read these written materials at home.

EMPIRICAL RESULTS

Data for this section focused on student preference, student behavior, and student academic performance collected from four different data sets of surveys conducted at Hartford Public Schools with participating teachers. Table 3 reflects student preference between human narration and computerized text-to-speech. Table 4 reflects changes in teacher observations of student behavior prior and after using CRISKids. Table 5 reflects a compilation of two different data sets collected from teacher surveys in which both ask teachers to indicate how many students improve their test scores after using CRISKids.

All the students in the study were in middle school (grades 6-8).

Student preference

Students were asked to indicate whether they preferred human narration or text-to-speech after listening to a recording of a school text. Out of 233 students, 82% preferred human narration.

Self-Regulation

The *CEDAR Self-Regulation Scale* was completed by teachers on the students with whom they work. The study showed that prior to CRISKids students with print disabilities also tended to demonstrate low levels of self-regulation: They were disruptive in class, had challenges with peer relations, did not deal well with disappointment, did not find it easy to sit “comfortably and calmly” in their seats, and were lonely in school. In total, 56 records were analyzed with 30 records from the “pre-test” stage and 26 from the “post-test” stage.

In order to determine whether improvement occurred over time, an analysis (paired samples t-Test) was conducted. The following table presents those instances in which improvement that was not due to chance (i.e., improvement that was “statistically significant” at the $p \leq .05$) was observed.

The table appears on the following page.

Table 3: Comparison of pre-test scores and post-test scores: (MORE of the behavior was observed over time)

In the following table, all the positive changes were not due to chance (i.e., they were “statistically significant”).

	Pre-test mean	Post-test mean	Level of significance
Demonstrates self-regulation (“personal control”)	3.88	4.92	.010
If angry with another student, able to put anger aside quickly	4.00	5.20	.005
Does not exclude other students from sports or recess activities	2.72	6.00	<.001

Pretest n = 30, Post-test = 26

As a result of CRISKids, students demonstrated more self-regulation. Their interactions with other students also improved.

The following table presents the result of an analysis that was conducted to determine if improvement could be discerned among the students in terms of reduction in classroom behavior that impeded learning (both for the individual student and for the class as a whole). *A higher mean score for the post-test indicates that there was a reduction in disruptive behavior.*

Table 4: Comparison of pre-test scores and post-test scores: (LESS of the behavior was observed over time)

In the following table, all the positive changes were not due to chance.

	Pre-test mean	Post-test mean	Level of significance
Appears lonely a lot of time at school	3.96	4.96	.006
Tends to act on impulse	3.04	3.76	.039
Often criticized for behavior (e.g., touching or hitting others, bullying) by other classmates.	4.16	5.28	.014
When called on in class, gets very nervous	3.16	3.96	.015
Tends to get upset about little things and thus cannot focus on work	2.56	3.80	.001
Demonstrates anxiety, fears	2.88	3.80	.014
Misses social cues	3.00	3.68	.041
Easily frustrated	2.76	3.28	.034
Sulks if not called on during classroom discussions	4.00	5.04	.003
In the heat of a debate over a small detail, negotiations can be difficult for him/her	4.48	5.60	.024

Pretest n = 30, Post-test = 26

As a result of CRISKids, students tended to act less on their impulses. They were less often criticized for their behavior by classmates. They demonstrated fewer fears and anxieties (nervousness when called on in class and inability to focus on work due to becoming upset about little things). They missed fewer social cues. They were not as easily frustrated. And there were fewer instances in which they sulked if not called on during classroom discussions. In the heat of a debate over a small detail, negotiations were less difficult. As noted above, participating students' interactions with their peers improved. They were less lonely at school.

Improved test scores

The participating teachers were asked to indicate how many of the students with whom they worked improved their Lexile reading test scores, academic achievement, and related classroom behaviors.

In total, the reading test scores of 46 students were collected. Of these, 41 students had complete data. The others joined or left during the school year; one student was exempt from testing.

Table 5: percentage of students with improved test scores (n=41)

# of students who used CRISKids	Improved test scores	Percent of students with improved test scores
41	30	73.17%

These initial findings indicate that 73% of students using CRISKids to access text showed improvement across an array of areas contributing to academic success.

An additional analysis was conducted on the results of 17 students for whom other data points were collected, including such related classroom behaviors as time on task, interest in reading materials, engagement/participation in class, and class grades. Of these students, 82% showed growth during the academic year.

While the use of CRISKids cannot be identified as the causal variable, it is an amalgamation of factors that contribute to student success. There is no detriment in increasing students' access to print through technology such as CRISKids, and most teachers are willing to incorporate any strategies or technology that gives any student more chance for success in the classroom every day.

CONCLUSION

The independent evaluation of CRISKids for Schools demonstrated that students with print disabilities possess the cognitive abilities and background knowledge to grapple with the ideas presented in complex texts but are unable to fully engage in classroom conversations simply because of the media – print – in which these ideas are presented. CRISKids enables students to access written texts in a non-stigmatizing way. Since students who feel competent in their reading and class work tend to be more engaged and less disruptive in class, CRISKids impacts not only the students who are unable to access written texts, but the learning environment of all the students

in the classroom. The professional development paired with CRISKids initiative was characterized as “some of the best” because it offered “cool new ways of teaching and learning.” In addition, a Hartford administrator who joined the last quarter professional development in the classroom noted, “The most valuable PDs are when teachers are able to see strategies taught to their students.” Based on the preliminary evidence collected, academic initiatives to pair technology supports with pertinent professional development (such as that created by CRISKids) have the potential to support both students and teachers.

APPENDIX

Different data sets were used for this report. Below is the CEDAR Self-Regulation Scale Survey and Student Performance Form. In addition, one participating teacher submitted information regarding changes only with student reading test scores. These different data sets reflect preliminary information collected from participating teachers, and while not comprehensive, it does adequately represent changes in student behavior and test scores after using CRISKids.

Student Performance Form

How many of your students used CRISKids this year? _____

Please indicate how many of your students improved in the following ways. Please write the actual number of students. For example, if 6 of your students using CRISKids increased their time on task, then please write the number “6”.

_____ Improved test scores

_____ Increased time on task

_____ Improved class grades

_____ Increased interest in reading materials

_____ Increased engagement and/or participation in class

_____ Met or exceeded IEP goals, if applicable.

If your students improved their reading and literacy skills, how often did they use CRISKids?

_____ Infrequently

_____ Some of the time

_____ Most of the time

_____ Always

Works cooperatively and is able to compromise	<input type="radio"/>						
Transitions easily from one activity to the next	<input type="radio"/>						
Expresses needs and feelings in a way that is likely to result in good outcomes	<input type="radio"/>						
Demonstrates self-regulation ("personal control")	<input type="radio"/>						
Quickly recovers from challenging social situations	<input type="radio"/>						
Deals well with disappointment	<input type="radio"/>						
Remains calm under pressure	<input type="radio"/>						
Takes responsibility for mistakes made (i.e., does not blame others)	<input type="radio"/>						
Finds it easy to sit "comfortably and calmly" in seat	<input type="radio"/>						
When angry, makes sure not to hurt anyone's feelings	<input type="radio"/>						
When angry, makes sure not to hurt anyone physically	<input type="radio"/>						
Excludes other students from sports or recess activities	<input type="radio"/>						
Comfortable talking to adults when worried	<input type="radio"/>						
If angry with another student, able to put anger aside quickly	<input type="radio"/>						
[For older students] During class discussions, open to the viewpoints of others	<input type="radio"/>						
[For older students] If sees something that needs to be improved, offers criticism in a helpful way -- not a hurtful way	<input type="radio"/>						
[For older students] Knows how to evoke positive regard in adults	<input type="radio"/>						

Student's Areas of Improvement

Please note that the scale changes for this section.

For the following section, the scale ranges from 1 to 7 -- with a score of 7 representing a "Never" rating.

When receiving feedback, tends to respond with arguments and explanations rather than acceptance

In the heat of a debate over a small detail, negotiations can be difficult for him/her

[For older students] Has no one to eat lunch with

[For older students] Often criticized for things said (e.g., talking out of turn, interrupting others, or cracking jokes) by one or more teacher

[For older students] Often criticized for things said (e.g., talking out of turn, interrupting others, or cracking jokes) by classmates

Is there anything else that you would like us to know?